



Title: Computer graphics

Final exam, Date: 3/6/2012, Total marks: 75

Course code: CCE2211

Allowed time: 3 hours

Year: Second year

Number of pages: 2

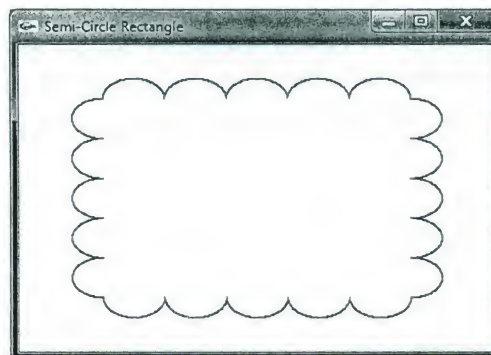
Workout the following questions

Question 1 (15 marks)

- a) A graphics programmer or designer works with some interfaces or APIs to produce graphics. Two conceptual models could be used to describe the interaction between the programmer/designer and the interface/API: pen-plotter model and the 3D. Explain the difference between the two models. (5 marks)
- b) The memory in a frame buffer must be fast enough to allow the display to be refreshed at a rate sufficiently high to avoid flicker. A typical workstation display can have a resolution of 1280 x 1024 pixels. If it is refreshed 72 times per second, how fast must the memory be? That is, how much time can we take to read one pixel from memory? What is this number for a 480 x 640 display that operates at 60 Hz but is interlaced? (10 marks)

Question 2 (15 marks)

Write a C++ program that calls the OpenGL library to draw the following figure on the screen. Clearly explain your design steps in modeling the required figure. (15 marks)



Question 3 (15 marks)

- a) The following figure shows a scene that appears deformed when displayed on the output screen of an OpenGL program (5 marks)
 - i. Discuss possible reasons that could lead to the shown deformation
 - ii. How you can avoid such deformations?



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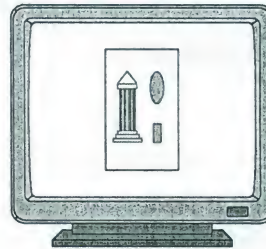
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- b) What is the purpose of each of the following OpenGL function calls? Explain how the parameters are used, if any. (10 marks)
- `glClear(GL_COLOR_BUFFER_BIT);`
 - `glutInitDisplayMode(GLUT_SINGLE | GLUT_RGB | GLUT_DEPTH);`
 - `glEnable(GL_DEPTH_TEST);`
 - `glOrtho(-50.0, 50.0, -50.0, 50.0, -50.0, 50.0);`

Question 4 (15 marks)

- Writing text using OpenGL can be done using stroke or raster text drawing. Differentiate between the two types in stressing the advantages and disadvantages of each of them? (5 marks)
- Write an OpenGL program to draw a damped cosine functions four times, each in a separate quarter in the output graphics window. Hint; use the viewport setting to change the location and size of the output graphics area with respect to the output graphics window. (10 marks)

Question 5 (15 marks)

- Explain the difference between physical input devices and logical input devices. Give examples for each (5 marks)
- Write an OpenGL program to draw a rectangle of size 3 by 3 units each time the mouse is left-clicked with a color chosen randomly. The program terminates when the user right-click the mouse. Your program should interact correctly even if the user changed the window size. (10 marks)

Good Luck

The examination committee